

# THE CAMBRIDGE STATISTICS DISCUSSION GROUP

Tuesday 3rd February 2004 7:15 for 7:45

Department of Applied Mathematics and Theoretical Physics,  
Centre for Mathematical Sciences,  
Wilberforce Road,  
Cambridge

## Dealing with Missing Outcome Data

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**Abstract:** Randomised controlled trials usually have individuals with missing outcomes. Inadequate handling of these missing data in the analysis can cause substantial bias in effect estimates. In the last few years suggestions in the statistical literature have been made to explore the nature of missing data and methods to minimise potential bias, however, results from a recent survey of the medical literature show these are rarely used. Results from the survey will be presented, focusing on statistical procedures for handling missing data and sensitivity analyses. We will then review various methods to handle missing outcomes in single and repeated measures data, covering a wide spectrum of missing data assumptions. Using data from a randomized controlled trial to compare two interventions for increasing physical activity, we compare the following: complete-case analysis; ad-hoc imputation techniques such as last observation carried forward and worst-case; model-based imputations; random effects longitudinal models; and recently proposed joint models for longitudinal data and non-ignorable dropout. Results from ad hoc imputation methods vary widely. Standard multiple imputation and repeated measures modelling agree closely. Modifying the modelling method to allow for informative dropout did not affect our conclusions, but imputing using a common model in both arms gave more conservative results. We conclude results from ad hoc imputation methods should be interpreted with caution. Standard multiple imputation methods and repeated measures modelling methods are equivalent. However, the imputation and modelling families suggest different ways of relaxing the missing-at-random assumption, and the choice between them depends on contextual knowledge.

**Speaker:** Angela has been working as a research statistician for 2 years, funded by the Medical Research Council, based at the Biostatistics Unit in Cambridge. Prior to this she did her doctorate in the Mathematics and Statistics Department at Lancaster University. Current research interests include methods for dealing with missing data and joint modelling of longitudinal and time-to-event data.

**Directions:** The main entrance is reached from Clarkson Road by going along the footpath to the right of the Newton Institute, and turning left through the gatehouse towards the main building (Pavilion A), which has a glass front and a curved grassed roof. The main entrance is in the middle of the glass front. (See also enclosed map). Free Parking is available after 5pm on Clarkson and Wilberforce Roads and by entering the site off Wilberforce Road. Admittance may be difficult after 7:45.

**Provisional Next Meetings:**

3rd March - Haidee Philpott & John Law (NIAB) on 'A case study in Winter Wheat Fungicide Trials in the UK 1991-2001'.  
5th April - Anthony Edwards (Gonville and Caius).

13th May - Melanie Cooray (Statwood Partnership).

**Supper:** Some members eat regularly in the University Centre before each meeting at 6pm. Feel free to join them.

**Subscriptions:** of 4 pounds are now due for the 2003-2004 session.

**Secretary:** Peter Watson, MRC Cognition and Brain Sciences Unit, 15 Chaucer Road, Cambridge CB2 2EF;  
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